

THE SPACE STATION

Abraham Munoz

Conceived since the beginning of time, living in space is no longer a dream but rather a very near reality. In times and civilizations past man could only dream of the vastness of space. No longer is man restricted to land and sea, he has found a new frontier to extend himself to. In his quest to explore this new realm, man must possess the greatest of knowledge and use it well. Although much time will elapse, space will succumb to another master.

America's space program rose from an advisory committee, National Advisory Commission on Aeronautics, to a supreme aerospace organization, National Aeronautics and Space Administration. Many great projects and moments are now under America's belt, but many more are yet to come. NASA's newest challenge was well described by our great president, Ronald Reagan, in his State of the Union Message on January 5, 1984.

We can follow our dreams to distant stars, living and working in space for peaceful economic and scientific gain. Tonight, I am directing NASA to develop a permanently manned Space Station and to do it within a decade.

A Space Station will permit quantum leaps in our research in science, communications and in metals and life-saving medicines which can be manufactured only in space.

This conception is not a new one, but a redefined one. In the early seventies Skylab represented an early and successful configuration of space stations to come. NASA learned a great deal from this project. Much of what it learned, ranging from human behavior in space to experiments in space, will be very useful to this next generation of space stations.

In order to meet its deadline of ten years (although it's hoping to do the job in eight years in commemoration of Columbus' 500th anniversary of the discovery of the New World) NASA and its contractors are constantly working to develop the design of the Space Station that is due sometime in 1987. Many investigations on the kinds of experiments and work assignments the Space Station will need to accommodate have been completed, but NASA specialists are constantly talking with potential users of the Station to learn more about the work they, the users, want to do in space.

As presently proposed, the core of the Space Station will consist of six or seven modules, cylinders of approximately 14 ft in diameter by 24 ft long (see figure 1). One of these modules will be used by the European Space Agency, ESA, and another by Japan. The remainder, of course, will be used by the United States. They will be designed and arranged so that newer and more sophisticated modules can be added in the future. The Space Station will grow as its importance grows. Each module will

be pressurized to a normal human level and will contain its supply of necessary oxygen. They will be connected by hubs (see figure 1). These hubs will permit easy mobility between modules and are the connection areas for future modules.

One of these modules will house the crew on board the Station. Separate living quarters will be provided for each astronaut. Although astronauts don't need beds in space, for they float in zero-gravity, they do need straps to hold them in place. They will substitute vertical sleeping bags for the regular horizontal beds. These quarters will be private and personal areas for the astronauts to retreat to. Designed to serve as a home away from home, the Space Station will be a home to between six and eight people. Each crew will be in space for approximately 90 days. At the end of the 90 days a new crew will come up from Earth on the shuttle to replace the previous crew. Within each crew half of the members will work one shift while the other half sleeps. This rotation system will allow for more room, around the clock personnel, and less fatigue on the station. From past experience, data taken from Skylab and information released from the Soviet space stations Salyut and Mir, it has been obvious that workers in space become homesick. They miss their families, friends, food, sights, and sounds which they were accustomed to on Earth. In order to solve this problem, personal photos and items are to be allowed in each crew member's sleeping quarters. Daily phone calls to family members will be available. Because bird chirping, the blowing of wind and other natural sounds are obvious Earth sounds, they are being proposed to be played on board the station at a subliminal level so they can be picked up by the subconscious mind, thus creating an artificial Earth-sounding environment. Viewing our planet, as told by former astronauts, is such a spirit-lifting experience that windows will be strategically placed to provide this pleasure. Providing a home-like atmosphere for people in space will increase morale and productivity.

Two other modules are scientific laboratories. They will be used to carry out experiments which can only be done in space or experiments which benefit from zero-gravity. In these labs basic research in medicine, astronomy, space physics and other fields will be carried out. These studies will be aimed at developing useful services and products for industrial customers and users. These labs will serve as national laboratories upon which our nation can depend for economic and social well-being in an increasingly competitive and sophisticated world. Another module will serve as a logistics unit, primarily a supply module. All necessary supplies required for a three-month stay in space will be kept here. This will keep the other modules free from any supplies that shouldn't be there. One other module will serve as a berthing dock for the Space Shuttle. Being that the shuttle is the only transportation vehicle between the Space Station and Earth there must be an area in which to park the shuttle. It will be through the Space Shuttle that the new crews and supplies will be brought up at the end of each three-month period. In case of an emergency the shuttle will be sent to respond to the incident. Also in one of these modules a kitchen and an exercise room will be located.

These modules will be connected to large trusses (see figure 1). Extending away from the modules will be two sets of large solar panels which will generate enough energy from the sun to provide the necessary power for the entire complex. Gliding along the trusses will be a remote controlled robot arm. This manipulation unit will allow for easy on-board repairs of the station and quick structure relocations.

Although much of the work which will be done on the station will be directed by the crew itself, continual communication linkage between ground control and the station is required. A dish antenna on the station will connect both parties.

Each part of the Space Station will be carried separately on the space shuttles. Then as each part arrives in space it will be connected to the previous structure which is already in space. The trusses and solar panels will be the first items to be launched. During the fifth or sixth shuttle launch the first module is expected to go up. The module will go up as a single unit so that it can easily be connected to the other structures already intact. It is during these next few launches that the Space Station will become habitable by our astronauts. The remaining parts of the Space Station will continue to go up as soon as possible and on schedule if all goes well. Between 14 and 17 launches are expected in order to complete the station which will be 250 miles above the Earth's equator.

Once the station becomes operational America will begin to reap the harvest of its work. Space does not limit itself to one field. Commercial uses in space are limitless. First and foremost, many satellites near low-Earth orbit will be in need of repair. Using the Manned Maneuvering Units, MMUs, astronauts from the Space Station can easily repair the satellites. The cost to the customer will be substantially less than if he were to have replaced the satellite. Also, the space telescope, which is planned to be launched as soon as the Space Shuttle becomes operational, will need tending. Much knowledge about deep space will be gathered from this instrument, and for this reason it must be kept operational at all times. The research being done on the Space Station cannot be put aside. This research will greatly aid those people, industry, who invest in it. This in turn will benefit our entire society.

As important as the research going on in space, will be the future manned and unmanned voyages which will use the Space Station as a port. From here the United States of America can commence plans for building a lunar base. All the necessary material would be sent to the station and from there on to the moon. A lunar base has many uses and will benefit from having the Space Station at its disposal. During this same time period, between 2000-2010, a manned mission to Mars would become more attractive. By assembling the spacecraft in orbit and launching it there, it will not need to be equipped for a strenuous passage through the Earth's atmosphere. Instead, it can be constructed entirely for use in the vacuum of space with resulting design and economical advantages. The trip to Mars and a Martian base would be mankind's next giant leap in his quest to increase his knowledge of the universe.

Maintaining U.S. Leadership in space, studying the Earth's resources, developing new manufacturing and processing techniques, basic science and technology research, and becoming a port for future interplanetary voyages is the purpose of this eight billion dollar Space Station. For 20 years after it's completed (this is the life expectancy of the station) the Space Station will serve as a symbol of national pride and honor. It will kindle our imagination and creativity. It will inspire America's youth to reach for greater achievements, and hopefully will inspire them to seek professions in space-related fields. Within those 20 years the Space Station may become obsolete as a better breed of space stations emerges. But one thing remains for certain,

and that's that this Space Station will be the Pinta, the Niña, and the Santa Maria embarking on a trip to explore the new world of space.

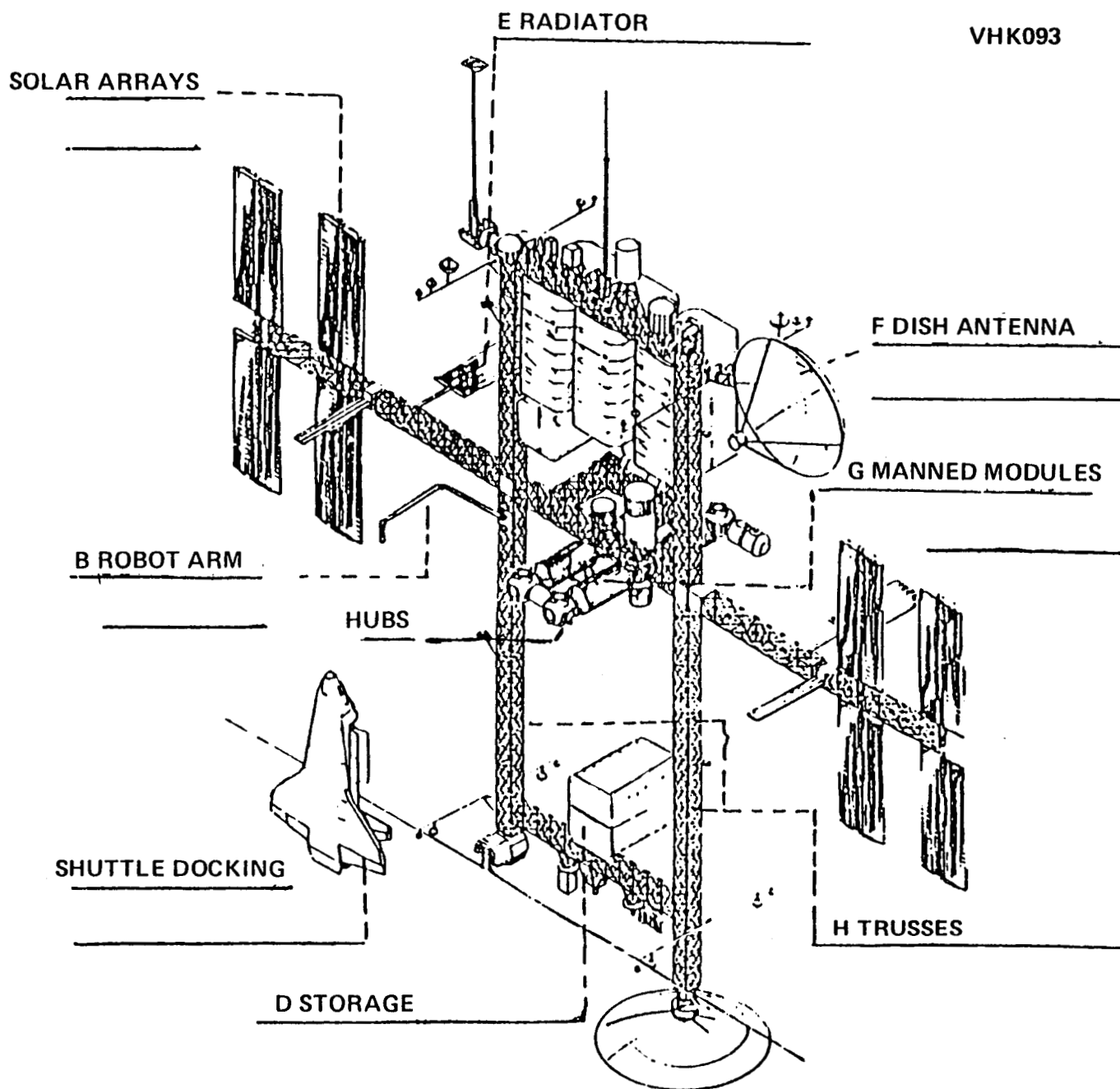


Figure 1.- Features of the Space Station.